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NEW STANDARD 200-HP PADDLE WHEEL STEAM RIVER TUG

A. V. Baybakov
Stalin Prize Laureate

In 1950, the USSR river fleet was supplemented by new 200-horsepower steam tugs. The first tug of this class, the Molodaya Gvardiya, was built and accepted by a commission of the Ministry of River Fleet in June 1950.

The new tugs have the following specifications:

Over-all length	47.8 m
Length of hull between perpendiculars	43.8 m
Beam at midship	7.0 m
Beam over paddle walks	15.3 m
Height of side at midship	2.25 m
Light draft	0.65 m
Light displacement	165 t
Draft at full displacement with a 40-ton fuel supply	0.8 m
Displacement, fully loaded	205 t
Towing speed	8 km/hr
Tractive force at a speed of 8 km/hr:	
Planned	2.3 t
Actual in test	2.6 t

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Capacity:

Planned	200 indicated
Actual in test	210 indicated

Towing efficiency:

Planned	34%
Actual in test	37%

Expenditure of equivalent fuel:

Planned	1 kg/indicated
Actual in test	0.9 kg/indicated

The tug was built in conformance with the Type BR-200 tug, according to GOST 3445-46. The traction qualities obtained in tests exceed by 13 percent the indexes provided for by the GOST.

The BR-200 tugs are designed for towing rafts and nonself-propelled boats on shallow rivers.

The working steam pressure has been established at 16 atmospheres and the temperature at 300 degrees plus or minus 20 degrees centigrade. The boiler installation of the ship consists of a three-cornered water tube boiler with a heating surface of 85 square meters feeding the main steam engine, which is a sloping-type compound steam engine with valve steam distribution. The steam is superheated. The basic dimensions of the steam engine are 375 x 800 x 800 millimeters. At 33.5 revolutions per minute and with a 56-percent filling of the high-pressure cylinder, the steam engine in tests developed a power of 210 indicated horsepower.

The steam engine works on a surface-type condenser. Vacuum in the condenser is furnished by a two-step steam ejector. In tests, the vacuum amounted to 85-90 percent.

The condensate from spent steam is pumped from the condenser by a condensate pump mounted on the main engine; the pump then delivers the condensate into the hot well through a carbon filter with a sponge; the filter is installed on the feed pipe of the condensate pump. The hot well is equipped with a cascade, an oil outlet, a coke filter, and a settling tank.

Condensate from the settling tank of the hot well is collected by the feed pumps, also mounted on the main engine, and is delivered to the feed head of the boiler through a three-section water superheater.

The boiler is equipped with a float-type automatic feed system.

Lubrication of the main steam engine is done automatically by four locomotive-type, multiple outlet, pressure lubricators. Three outlets of a pressure lubricator are used to lubricate the cylinders and the starting valve of the steering engine.

In tests, the expenditure of steam in the main steam engine amounted to 6.18 kilograms per indicated horsepower per hour, as against a planned 6.8 and a figure of 7.5 for prototype engines of prewar construction.

In tests, the efficiency of the boiler when fired with ARSh anthracite was slightly more than 80 percent.

For the most part, the auxiliary machinery of the tug is standard with the same machinery as the 400-horsepower steam tugs: deck machinery (windlass, steering engine), steam pumps (reserve feed pump and hold fire pump), injectors and ejectors, filters, oil separators, power pumps of the main engine, steam dynamo, etc., since it is still impossible to obtain other suitable equipment. In the future, steps will be taken to create auxiliary equipment of less weight, smaller size, more economical of steam, and more suitable for the smaller tug.

The paddle wheels of the tug have wooden paddles on short spindles with floating bushings. The diameter of the wheels along the center of the spindles is 2,400 millimeters, the paddles are 500 milimeters x 3,600 milimeters and there are eight paddles. At a speed of 8 kilometers per hour, these wheels showed a specific traction of 13 kilograms per indicated horsepower.

The hull of the tug is welded. The bow and stern are wedge-shaped. The tug has electric lighting, electric sound signaling, a radio sending and receiving set and a public address system. To change the trim, the tug has bow and stern ballast tanks and a separate ballast pipe from the steam hold fire pump.

The acceptance commission of the Ministry of River Fleet noted the positive qualities of the tug and recommended it, as standard, for large-scale serial production. At the same time, the commission made some suggestions to improve its operational qualities.

To permit the use of this tug for work in the upper stretches of small rivers which are exceptionally narrow or have shoals, the commission suggested that a part of the serially produced tugs should be built with a modification of the paddle wheel which, while keeping traction loss to a minumum, would reduce the beam from 15.3 meters to 13 or 13.3 meters. Preliminary calculations have shown that with a beam of 13.3 meters, the wheels of changed design produce a tractive force of about 2.3 tons, i.e., a tractive force corresponding to GOST 3445-16. The other characteristics and parts of the tugs will remain unchanged.

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